

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A parallel processing system for operating an OS for single processors and an application on a plurality of processors and achieving parallel processing by said plurality of processors with respect to said application, comprising:

a parallel processing unit which controls units of work which are parallel processable within said application on one processor of the plurality of processors as new units of work on another processor of the plurality of processors, which parallel processing unit belongs to one processor of said plurality of processors; and

an inter-process communication unit which controls inter-process communication between processes executed on the plurality of processors, which inter-process communication unit is functionally provided independently of said OS,

wherein said inter-process communication unit receives a system call request related to said inter-process communication issued from processes of said one processor or said another processor to said OS for single processors and issues a request for process control to said OS for single processors of said one processor or said another processor by using a system call;

wherein, said plurality of processors are logically divided into at least two groups of at least a first processor group and a second processor group;

wherein, said parallel processing unit belonging to one processor of said first processor group sends a request for units of work that are parallel processable within said application on said first processor group to at least one processor of said second processor group;

wherein, said at least one processor of said second processor group controls the units of work as new units of work based on said request; and

wherein, the unit of work that can be parallelized within said application is created in advance on a processor on said second processor group.

2. (canceled).

3. (currently amended): The parallel processing system as set forth in ~~claim 2~~claim 1, wherein said inter-process communication unit is provided on a processor of said first processor group and on a processor of said second processor group.

4. (canceled).

5. (currently amended): ~~The A~~ parallel processing system as set forth in claim 2, wherein for operating an OS for single processors and an application on a plurality of processors and achieving parallel processing by said plurality of processors with respect to said application, comprising:

a parallel processing unit which controls units of work which are parallel processable within said application on one processor of the plurality of processors as new units of work on another processor of the plurality of processors, which parallel processing unit belongs to one processor of said plurality of processors; and

an inter-process communication unit which controls inter-process communication between processes executed on the plurality of processors, which inter-process communication unit is functionally provided independently of said OS,

wherein said inter-process communication unit receives a system call request related to said inter-process communication issued from processes of said one processor or said another processor to said OS for single processors and issues a request for process control to said OS for single processors of said one processor or said another processor by using system call;

wherein, said plurality of processors are logically divided into at least two groups of at least a first processor group and a second processor group;

wherein, said parallel processing unit belonging to one processor of said first processor group sends a request for units of work that are parallel processable within said application on said first processor group to at least one processor of said second processor group;

wherein, said at least one processor of said second processor group controls the units of work as a new units of work based on said request; and

wherein, the unit of work that can be parallelized within said application is created and activated as a new unit of work on a processor on said second processor group.

6. (currently amended): The parallel processing system as set forth in ~~claim 2~~claim 5,

wherein

 said OS for single processors having a virtual memory mechanism is mounted on at least one processor on said first processor group and each processor on said second processor group.

7. (previously presented): The parallel processing system as set forth in claim 6, wherein

the new unit of work on at least one of the processors on said second processor group is controlled synchronously or asynchronously with the unit of work on the at least one processor on said first processor group.

8. (previously presented): The parallel processing system as set forth in claim 6, wherein synchronous processing and data transmission and reception are enabled between units of work on the at least one processor on said first processor group and on at least one processor on said second processor group.

9. (previously presented): The parallel processing system as set forth in claim 8, wherein the inter-process communication unit which executes synchronous processing and data transmission and reception between said units of work by a semaphore system and a message queue system is provided on the at least one processor on said first processor group and on the at least one processor on said second processor group.

10. (currently amended): The parallel processing system as set forth in claim 2~~claim 5~~, wherein

a parallel processing unit which conducts control related to the unit of work including said creation of the unit of work and an OS service unit which provides service of said OS for single processors to said unit of work are incorporated into each of said first processor group and said second processor group.

11. (currently amended): The parallel processing system as set forth in ~~claim 2~~claim 5, comprising

a control processing relay unit which conducts transmission and reception of a control signal and data between said first processor group and said second processor group.

12. (previously presented): The parallel processing system as set forth in claim 11, wherein

said control processing relay unit includes an interruption control device corresponding to each processor and a communication region corresponding to each processor,

said interruption control device being formed of an interruption instruction unit which instructs other processor to interrupt, an interruption state holding unit which holds information that an interruption is made by an interruption instruction and an interruption cancellation unit which clears an interruption, and

said communication region being formed of a communication reason holding region which holds a communication reason from a communication source processor, a communication data holding region which holds communication data to be communicated and a mutual exclusive control region which locks a communication region to ensure communication.

13. (previously presented): The parallel processing system as set forth in claim 11, wherein

said control processing relay unit includes an interruption control device corresponding to each processor and a communication region corresponding to each processor,

said interruption control device being formed of an interruption instruction unit which instructs other processor to interrupt, an interruption state holding unit which holds information that an interruption is made by an interruption instruction and an interruption cancellation unit which clears an interruption, and

 said communication region being formed of a communication queue which holds a communication reason from a communication source processor and communication data to be communicated and a mutual exclusive control region which locks a communication region to ensure communication.

14. (previously presented): The parallel processing system as set forth in claim 10,
wherein

 a proxy unit is provided on said first processor group, which is associated with the unit of work on said second processor group by a processing unit number to conduct notification of various kinds of control signals between the unit of work on said second processor side and said OS for single processors.

15. (previously presented): The parallel processing system as set forth in claim 10,
wherein

 said parallel processing unit, the OS service unit, the control processing relay unit and the proxy unit are incorporated in a modular fashion.

16. (previously presented): The parallel processing system as set forth in claim 10,
wherein

said parallel processing unit on said second processor group is provided with a function of creating a unit of work to be parallel-processed by other processor on said second processor group.

17. (currently amended): The parallel processing system as set forth in ~~claim 1~~^{claim 5}, wherein

each said processor is mounted with said OS for single processors having a virtual memory mechanism to enable synchronous processing and data transmission and reception between the units of work on said one processor and said other processor.

18. (previously presented): The parallel processing system as set forth in claim 17, wherein

the inter-process communication unit executes synchronous processing and data transmission and reception between said units of work by using a semaphore system and a message queue system is provided on each said processor.

19. (previously presented): The parallel processing system as set forth in claim 17, comprising

a control processing relay unit which conducts transmission and reception of a control signal and data at the time of synchronous processing and data transmission and reception between said units of work on each said processor.

20. (currently amended): A parallel processing program stored on a computer-readable medium for achieving parallel processing by a plurality of processors with respect to an application on a parallel processing system for operating an OS for single processors and said application on said plurality of processors, comprising the functions of:

a parallel processing function of controlling units of work which are parallel processable within said application on one processor of the plurality of processors as new units of work on another processor of the plurality of processors; and

an inter-process communication function of controlling inter-process communication between processes executed on the plurality of processors, which inter-process communication function is functionally provided independently of said OS;

wherein said inter-process communication function includes

a function of receiving a system call request related to said inter-process communication issued from processes of said one processor or said another processor to said OS for single processors; and

a function of issuing a request for process control to said OS for single processors of said one processor or said another processor by using system call,

wherein, said plurality of processors are logically divided into at least two groups of at least a first processor group and a second processor group;

wherein, said parallel processing function belonging to one of said processors of said first processor group sends a request for units of work that are parallel processable within said application on said first processor group to at least one processor of said second processor group;

wherein, said at least one processor of said second processor group controls the units of work as new units of work based on said request; and

a function of creating the unit of work that can be parallelized within said application in advance on a processor on said second processor group.

21. (canceled).

22. (currently amended): The parallel processing program stored on a computer-readable medium as set forth in ~~claim 21~~claim 20, wherein said inter-process communication function is provided on a processor of said first processor group and on a processor of said second processor group.

23. (canceled).

24. (currently amended): ~~The A~~ parallel processing program stored on a computer-readable medium ~~as set forth in claim 21, comprising the function of~~for achieving parallel processing by a plurality of processors with respect to an application on a parallel processing system for operating an OS for single processors and said application on said plurality of processors, comprising the functions of:

a parallel processing function of controlling units of work which are parallel processable within said application on one processor of the plurality of processors as new units of work on another processor of the plurality of processors; and

an inter-process communication function of controlling inter-process communication between processes executed on the plurality of processors, which inter-process communication function is functionally provided independently of said OS,

wherein said inter-process communication function includes
a function of receiving a system call request related to said inter-process communication
issued from processes of said one processor or said another processor to said OS for single
processors, and

a function of issuing a request for process control to said OS for single processors of said
one processor or said another processor by using system call,

wherein, said plurality of processors are logically divided into at least two groups of at
least a first processor group and a second processor group;

wherein, said parallel processing function belonging to one of said processors of said first
processor group sends a request for units of work that are parallel processable within said
application on said first processor group to at least one processor of said second processor group;

wherein, said at least one processor of said second processor group controls the units of
work as new units of work based on said request; and

a function of creating and activating the unit of work that can be parallelized within said
application as a new unit of work on a processor on said second processor group.

25. (currently amended): The parallel processing program stored on a computer-readable
medium as set forth in ~~claim 21~~claim 24,

which is executed on at least one processor on said first processor group and each
processor on said second processor group mounted with said OS for single processors having a
virtual memory mechanism.

26. (previously presented): The parallel processing program stored on a computer-readable medium as set forth in claim 25, comprising the function of controlling the new unit of work on at least one processor on said second processor group synchronously or asynchronously with the unit of work on the at least one processor on said first processor group.

27. (previously presented): The parallel processing program stored on a computer-readable medium as set forth in claim 25, comprising the function of enabling synchronous processing and data transmission an reception between units of work on the at least one processor on said first processor group and on the at least one processor on said second processor group.

28. (previously presented): The parallel processing program stored on a computer-readable medium as set forth in claim 27, wherein the inter-process communication function executes synchronous processing and data transmission and reception between said units of work by using a semaphore system and a message queue system is executed on the at least one processor on said first processor group and on the at least one processor on said second processor group.

29. (currently amended): The parallel processing program stored on a computer-readable medium as set forth in claim 21claim 24, wherein each of said first processor group and said second processor group is provided with a parallel processing function of conducting control related to the unit of work including said

creation of the unit of work and an OS service function of providing service of said OS for single processors to said unit of work.

30. (currently amended): The parallel processing program stored on a computer-readable medium as set forth in ~~claim 21~~claim 24, comprising

a control processing relay function of conducting transmission and reception of a control signal and data between said first processor group and said second processor group.

31. (previously presented): The parallel processing program stored on a computer-readable medium as set forth in claim 29, comprising

on said first processor group, a proxy function which is associated with the unit of work on said second processor group by a processing unit number to conduct notification of various kinds of control signals between the unit of work on said second processor side and said OS for single processors.

32. (previously presented): The parallel processing program stored on a computer-readable medium as set forth in claim 29, wherein

said parallel processing function on said second processor group creates a unit of work to be parallel-processed by other processor on said second processor group.

33. (currently amended): The parallel processing program stored on a computer-readable medium as set forth in ~~claim 20~~claim 24, wherein

on each said processor mounted with said OS for single processors having a virtual memory mechanism, synchronous processing and data transmission and reception is enabled between the units of work on said one processor and said other processor.

34. (previously presented): The parallel processing program stored on a computer-readable medium as set forth in claim 33, wherein

the inter-process communication function executes synchronous processing and data transmission and reception between said units of work by using a semaphore system and a message queue system is executed on each said processor.

35. (previously presented): The parallel processing program stored on a computer-readable medium as set forth in claim 33, wherein

a control processing relay function of conducting transmission and reception of a control signal and data is executed at the time of synchronous processing and data transmission and reception between said units of work on each said processor.